

**Calendar No. 667**

105TH CONGRESS }  
2d Session }

SENATE

{ REPORT  
105-357 }

**HARMFUL ALGAL BLOOM AND HYPOXIA  
RESEARCH AND CONTROL ACT OF 1998**

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R E P O R T

OF THE

COMMITTEE ON COMMERCE, SCIENCE, AND  
TRANSPORTATION

ON

S. 1480



SEPTEMBER 30, 1998.—Ordered to be printed

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SENATE COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION

ONE HUNDRED FIFTH CONGRESS

SECOND SESSION

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Mr. MCCAIN, from the Committee on Commerce, Science, and  
Transportation, submitted the following

### REPORT

[To accompany S. 1480]

The Committee on Commerce, Science, and Transportation, to which was referred the bill (S. 1480), “A Bill to authorize appropriations for the National Oceanic and Atmospheric Administration to conduct research, monitoring, education, and management activities for the prevention, reduction, and control of harmful algal blooms, including blooms of *Pfiesteria piscicida*, and other aquatic toxins, hypoxia, and for other purposes,” having considered the same, reports favorably thereon with an amendment in the nature of a substitute and recommends that the bill (as amended) do pass.

#### PURPOSE OF THE BILL

The purpose of S. 1480, the Harmful Algal Bloom and Hypoxia Research and Control Act of 1998, is to facilitate the development of a comprehensive Federal response to the problems of harmful algal blooms (HABs) and hypoxia. As reported, the bill requires the creation of Federal action plans for HABs and hypoxia, and it authorizes appropriations in each of fiscal years 1999, 2000, and 2001 for research, monitoring, and assessment activities related to HABs and hypoxia by the National Oceanic and Atmospheric Administration (NOAA). The reported bill also authorizes funds for Federal technical assistance to support State activities related to HABs and hypoxia.

## BACKGROUND AND NEEDS

Marine algae and associated single-celled organisms are present in all ocean and coastal areas. In normal concentrations and life stages, these tiny organisms are benign and, in fact, they form a critical part of the marine food chain. Under certain circumstances, however, the population of a single algal species or several related species can rapidly increase in abundance, creating what is referred to as an algal “bloom”. HABs are algal blooms involving species that produce toxins or conditions that adversely affect other marine life. Some of these species contain pigments in their cells and when a bloom occurs, water in the affected area can become discolored.

The species associated with HABs include those that cause red tides, brown tides, and a variety of toxic poisoning syndromes throughout the United States and many parts of the world. They include *Pfiesteria piscicida* and similar species that have been detected from Delaware to Florida. The presence of some types of harmful algae, such as the species that cause red or brown tides, are relatively easy to identify due to their color, but other harmful species do not discolor the water. This relative invisibility can make the detection of some HABs more difficult, and careful testing is required to determine the presence and extent of blooms. Whether blooms are visible or not, they often cause adverse effects to humans and marine life.

Ironically, algal blooms can also create problems through their own death. As an algal population blooms, it may quickly outgrow the nutrients available to sustain itself. The organisms in the population subsequently die and decompose, depleting dissolved oxygen in the water. When large volumes of oxygen are depleted, other species in the marine environment suffer. These conditions of oxygen depletion are known as hypoxia (low oxygen concentrations) and anoxia (no oxygen). The huge hypoxic area or “dead zone” that forms annually in the Northern Gulf of Mexico results from die-offs on a massive scale of largely nontoxic algae.

HABs present a major ecological threat to the marine environment. Toxins emitted by HABs can harm other marine organisms both directly and indirectly. Certain forms of red and brown tides, for instance, can kill or injure huge quantities of fish that come in direct contact with them. The indirect path involves the accumulation of HAB toxins in animals that are not directly harmed by the toxins and the subsequent consumption of these animals. Various fish and shellfish species accumulate HAB toxins in their tissues at levels that are harmful or lethal when ingested by sea birds, larger fish, marine mammals, or humans. The known human illnesses caused by algal toxins are paralytic shellfish poisoning (PSP), diarrhetic shellfish poisoning (DSP), neurotoxic shellfish poisoning (NSP), amnesic shellfish poisoning (ASP, sometimes known as domoic acid poisoning or DAP), and ciguatera fish poisoning (CFP). Growing evidence indicates that *Pfiesteria* and similar organisms can also cause serious human health problems.

Algal toxins are among the most potent chemical compounds known. Some are far more lethal than sodium cyanide. The documented symptoms of algal toxin poisoning include neurological

problems (e.g., headaches, dizziness, memory loss, and motor function impairments), gastrointestinal problems, cardiovascular problems, and skin rashes or lesions. For some algal toxins, human consumption of a single contaminated clam or mussel can be fatal. In addition to exposure from consuming shellfish and fish contaminated with such toxins, humans are vulnerable to HABs through the contact of skin with or the inhalation of spray from contaminated water. To protect the public from these dangers when harmful algae or algal toxins have been detected, State and local governments close beaches to swimmers and shellfish beds to commercial and recreational harvesting.

HABs do not necessarily harm all marine vertebrate species, but some vertebrates are very vulnerable to particular algal toxins. Larger species, particularly marine mammals such as whales, dolphins, and manatees, can be especially susceptible. Red tides, for example, have been known to kill substantial numbers of dolphins and endangered manatees, including more than 150 manatees in Florida in 1996. Red tides and other HABs can also kill large quantities of certain fish species. In the fall of 1997, 14 million fish were killed by a red tide off the coast of Texas. *Pfiesteria* has a deadly effect on menhaden (a small coastal schooling fish), killing millions in North Carolina and Maryland in recent years, but it does not appear to have acute impacts on other fish species present in the same waters.

In addition to toxin-related impacts and oxygen depletion, HABs degrade the marine environment by partially blocking sunlight that submerged aquatic vegetation and important microorganisms, or phytoplankton, need to survive. Since submerged aquatic vegetation and phytoplankton provide the foundation for the marine food chain, any reduction in their productivity decreases the overall ecological productivity in affected areas. This shading damages important marine invertebrates, such as corals, as well.

Macroalgal or seaweed blooms can also cause serious problems. A suite of factors including nutrient loading and the loss of marine herbivores lead to macroalgal blooms. The result of these seaweed blooms can be the shading or smothering of other organisms, habitat degradation, and a significant decrease in available oxygen as the seaweeds decompose. Macroalgal blooms have been particularly troublesome in coral reef ecosystems where the slow-growing corals cannot keep pace with rapidly-growing macroalgae.

Over the past 25 years, the incidence and intensity of HABs have increased substantially, and today, virtually every U.S. coastal state and territory experiences them. More HAB species and toxins have been identified and more marine areas and resources are affected. The reasons for this proliferation of HABs are unclear. Possible explanations range from natural mechanisms of species dispersal (currents, tides, or dormant stages) to a host of human-related phenomena such as nutrient overloads, other kinds of pollution, climatic shifts, and transportation of algal species in ship ballast water.

The uncertainty surrounding the proliferation of HABs can be attributed in significant part to the fact that scientists still do not fully understand what causes HABs to form. As a general rule, algal biomass increases in number when there is an abundance of

nutrients in the water such as phosphorous or nitrogen. The sources of such nutrients include animal waste, farm runoff, sewage, or other types of pollution and they provide a basic source of energy for all types of algae. Excessive nutrient loading is, in fact, the primary cause of hypoxic events. But many scientists do not believe that the current science is adequate to establish a clear causal linkage between nutrient loading and HAB outbreaks. In addition, scientists have not yet conclusively identified the factor or factors that trigger the metamorphosis of some algal species from benign life stages to toxin-emitting life stages. The current deficiency in basic biological, biochemical, and ecological information about HABs has greatly hindered the development of safe and effective methods for controlling and preventing HABs.

The quality of technology for detecting the presence of toxic algal species and detecting whether a HAB is occurring varies. For red or brown tide species, visual analysis may be sufficient to indicate a bloom. But detecting an increase in the biomass of red tide algae before the full bloom develops, or detecting whether less visible HABs are occurring involves substantial work with sophisticated microscopes and lab analysis. The microscopes and other technology to detect algal species and numbers exist, but the process of moving back and forth from the water to the laboratories and analyzing the lab results takes time and money. Less cumbersome and expensive detection techniques need to be developed. Ideally, these new tests could be conducted in the field with rapid results. Similarly, there needs to be improvement in our ability to detect algal toxins.

Monitoring involves the use of detection and assessment techniques in a systematic way to determine the presence and scope of a bloom. Given the limits in the practicality of the current detection technologies, the development and implementation of comprehensive monitoring systems present significant challenges. Effective monitoring currently requires much time, staff, and money, and in some areas, such as Alaska's huge coastline, it is not practical with existing techniques. Consequently, Alaska simply prohibits shellfish harvesting in all of its southern coastal waters.

HABs generate a variety of economic impacts. These impacts include the costs to Federal, State, and local governments of conducting research and monitoring programs; short-term and permanent closures of harvestable shellfish and fish stocks; reductions in seafood sales; mortalities of wild and farmed fish, shellfish, submerged aquatic vegetation, and coral reefs; declines in tourism activity; and the medical costs of treating exposed human populations.

As with the scientific information, economic data on HABs are far from complete. There is no doubt, however, that the costs are significant for the coastal areas of the nation as a whole and can be extreme at the local level, especially in areas that suffer chronic HAB outbreaks. Preliminary analysis indicates an estimated \$45 million in average annual impacts nationally over the 1987–1993 period. It is clear, however, that the analysis significantly underestimates the actual level of impact. Losses from individual HAB events have equaled or exceeded the estimated average. The 1997 *Pfiesteria* outbreaks led to a substantial decline in the consumption of seafood harvested from the Chesapeake Bay. Losses to

watermen, seafood dealers, and restaurants are estimated at \$43 million.

In addition, the estimated annual losses due to HABs fail to include economic opportunity costs, or the costs of the economic opportunities foregone when marine resources are not utilized due to persistent toxicity or to the expectation of future toxicity. For example, it is estimated that Alaska foregoes a minimum of \$50 million a year in economic activity because its shellfish beds are closed as a result of PSP contamination. Many other coastal states experience HAB-related economic opportunity costs on a smaller scale.

The preliminary analysis also does not include “multiplier” effects that could substantially increase the estimate. Multipliers are commonly used to determine the economic costs of other disasters such as floods and hurricanes. Using multipliers in this instance, the estimate of HAB-related economic impacts in the United States easily exceeds \$100 million per year or \$1 billion per decade.

Since HAB events are increasing in scope, frequency, and intensity, the annual economic impact will likely grow in the future if the HAB problem is not effectively addressed.

Hypoxia (oxygen depletion) is another problem related to HABs. Without adequate oxygen in the water, other organisms (invertebrates, fish, and marine mammals) either flee the area or die, creating what is known as a “dead zone.” This has been a recurring problem in the northern Gulf of Mexico off the coasts of Louisiana and Texas. The lack of oxygen renders this entire area—which normally contains some of the most valuable fisheries in the United States, such as shrimp and red snapper—completely lifeless for much of the year. In 1996 and 1997, the Gulf dead zone reached approximately 7,000 square miles, an area roughly the size of New Jersey. Measurements taken this summer indicate that the 1998 dead zone may be somewhat smaller in geographic size—about 4,000 square miles—but they also indicate that oxygen has been depleted to greater depth in the affected area than in previous years.

Many experts agree that the prime culprit in the Gulf dead zone is the huge volume of nutrients and other pollutants carried into the Gulf by the Mississippi River. The Mississippi system drains portions of 31 states and the flowing water carries immense quantities of farm chemicals, treated sewage discharge, stormwater runoff, and pollutants from thousands of factories and refineries. Given the economic importance of the sources of this pollution, however, the Gulf dead zone problem presents a difficult management challenge.

Although it contains the most substantial example of hypoxia, the Gulf of Mexico is not the only area in the United States affected by this problem. A 1996 NOAA survey indicated that 53 percent of all U.S. estuaries experience hypoxia for at least part of the year and one-third experience anoxia.

While scientists have a better understanding of hypoxia than they do of many HAB-related problems, a major need for improved science still exists. The development of good models that can pinpoint how different upstream nutrient sources affect various estuaries is essential for rational management of the problem. In addi-

tion, scientists do not fully comprehend the dynamics of hypoxia once it occurs and its ecological and economic impacts.

In response to HABs, coastal states have developed or are developing monitoring programs and rapid response task forces that warn the public of the dangers and deal with new outbreaks. State environmental agencies and universities, and private research institutions such as the Bigelow Laboratory for Ocean Sciences in Maine, the Woods Hole Oceanographic Institution in Massachusetts, and the Mote Marine Laboratory in Florida, conduct important research related to the basic science of HABs and also research on detection and monitoring. These programs are expensive and the States and private sector alone have not been able to meet the current needs in all areas. Because their resources are limited, states like Alaska and others will often manage very conservatively to avoid public health risks. This is necessary to protect people, but in managing conservatively, the states can greatly increase economic losses by closing more areas to public access than may be necessary.

State responses to hypoxia tend to focus on nutrient loading in coastal waters. These activities are generally incorporated into the Coastal Nonpoint Pollution Control Program that applies to the coastal states and territories currently participating in the NOAA-administered Coastal Zone Management Program. NOAA and the Environmental Protection Agency (EPA) have approved 22 of the state coastal nonpoint programs, with the other 7 decisions due soon. Three more states have recently joined the program and will eventually develop plans. All of the states will need assistance to implement these plans. As with HABs, state resources for controlling hypoxia are not adequate to fully address current problems. One reason for this is the transboundary nature of some nutrient sources that lead to hypoxia.

Before 1992, the Federal government did not expend much direct effort on HABs. Some funding was spent on a case-by-case basis if a new HAB occurred, but there was neither a pro-active orientation, nor a significant ongoing program dedicated to the HAB problem. Overall, Federal funding levels were very low relative to the scope, complexity, and importance of HABs.

As concerns about the problem increased in the 1990's, the Federal government began to devote greater attention to HABs. In 1992, NOAA sponsored a workshop with the HAB research community to develop a National Plan. The workshop yielded a national research agenda and the creation of a Marine Biotoxins Program in NOAA. Also in 1992, Public Law 102-587 designated the Provasoli-Guillard National Center for Culture of Marine Phytoplankton (CCMP) of the Bigelow Laboratory for Ocean Sciences in Maine as a National Center and Facility. The CCMP contains the world's largest collection of marine phytoplankton, including HAB species, and therefore is a vital resource in the overall effort to identify, prevent, and control HABs.

In 1994, the Administration established an Ad Hoc Interagency Task Force on Marine Biotoxins and Harmful Algae to begin coordinating efforts on and identifying measures to address the problem. Later that year, NOAA created a National Office for Marine

Biotoxins and Harmful Algal Blooms at the Woods Hole Oceanographic Institution.

In 1996, the Administration created a program called Ecology and Oceanography of Harmful Algal Blooms (ECOHAB). This inter-agency program is dedicated to conducting the basic research necessary to understand HABs, why they occur, and how to combat them. Various agencies contribute funds to the program. Grant applications are solicited from universities, private research institutions, and Federal agencies. Grant funds are awarded on a competitive basis after review by a panel of experts. NOAA is the lead agency for ECOHAB, and other agencies participating include the EPA, the National Science Foundation (NSF), the U.S. Department of Agriculture (USDA), the Department of the Interior, the National Aeronautics and Space Administration (NASA), and the Office of Naval Research (ONR).

A 1997 scientific panel recommended the creation of a program complementary to ECOHAB that would focus on research related to the prevention, management, mitigation, and control of HABs rather than basic research. Various agencies such as NOAA, EPA, USDA, the Centers for Disease Control and Prevention, the National Institute of Environmental Health and Safety, the Food and Drug Administration, and NASA conduct some of these kinds of activities, but generally in the small and piecemeal manner reminiscent of the pre-ECOHAB basic research attempts. After the outbreak of *Pfiesteria* in Maryland and Virginia in 1997, the Administration created an ad hoc inter-agency task force to assist the states in addressing the problem. However, no similarly coordinated entity exists for other HABs. In fact, little overall has been done at the Federal level to prevent and control HABs relative to the scope and seriousness of the problem.

With respect to hypoxia, NOAA has done limited research due to funding constraints. In 1996, NOAA funded the Nutrient-Enhanced Coastal Ocean Productivity Program (NECOP) that surveyed coastal estuaries for hypoxia and other conditions. The NECOP study identified the scope of the national hypoxia problem. Subsequent Federal research and management activities specific to hypoxia have focused largely on the Northern Gulf of Mexico due to funding constraints and the severity of the problem in that area. Since the NECOP study showed hypoxic conditions in over half of the nation's estuaries, the Federal response needs to be broadened. Unfortunately, little follow-up work in this area has been conducted.

NOAA is also the lead agency in an ongoing inter-agency task force conducting an assessment of hypoxia in the northern Gulf of Mexico. This assessment is studying and analyzing the distribution, dynamics, and causes of the Gulf dead zone; the ecological and economic consequences of it; the sources and loads of nutrients transported by the Mississippi River to the Gulf of Mexico; the effects of reducing nutrient loads; methods for reducing nutrient loads; and the social and economic costs and benefits of such methods. The EPA and the USDA have done extensive work on nutrient loading caused by non-point source pollution—the primary cause of hypoxia.

## LEGISLATIVE HISTORY

Senators Snowe and Breaux introduced S. 1480 on November 8, 1997, and the bill was referred to the Committee on Commerce, Science, and Transportation. Cosponsors include Senators Hutchison, Mikulski, Hollings, Kerry, Stevens, Inouye, Akaka, Roth, and Robb.

The Subcommittee on Oceans and Fisheries held a hearing on the bill on May 20, 1998, with Senator Snowe presiding. Testimony was provided by representatives of NOAA and EPA, public and private research institution scientists, and an oyster grower from Louisiana representing the National Fisheries Institute and the National Marine Manufacturers Association.

On July 9, 1998, S. 1480 was considered by the Committee in an open executive session. The Committee, without objection, ordered S. 1480 reported with an amendment in the nature of a substitute.

Representative John of Louisiana introduced H.R. 4235, the Harmful Algal Bloom and Hypoxia Research and Control Act of 1998, on July 16, 1998. H.R. 4235 is identical to S. 1480 as reported with one minor technical change to section 7. The bill has been referred to the House Committees on Science and Resources.

## SUMMARY OF MAJOR PROVISIONS

Major provisions of S. 1480, as reported, include the following:

**Task Force and Action Plans.** The bill establishes an inter-agency task force to develop comprehensive, coordinated Federal action plans for HABs, hypoxia, and the chronic hypoxic condition in the northern Gulf of Mexico. Each of the action plans will identify actions that each agency will take to help prevent, reduce, and control the respective problems, and prevent unnecessary duplication of effort among the agencies. The action plans on hypoxia also address research needs.

**Authorization of Appropriations.** The bill authorizes appropriations for NOAA of \$27.5 million annually in fiscal year (FY) 1999 and FY 2000, and \$25.5 million in FY 2001, for research, monitoring, and assessment activities relating to HABs and hypoxia. The funds would be used for NOAA programs, for competitive, extramural research, and for technical assistance to the states.

## ESTIMATED COSTS

In accordance with paragraph 11(a) of rule XXVI of the Standing Rules of the Senate and section 403 of the Congressional Budget Act of 1974, the Committee provides the following cost estimate, prepared by the Congressional Budget Office:

U.S. CONGRESS,  
CONGRESSIONAL BUDGET OFFICE,  
*Washington, DC, July 21, 1998.*

Hon. JOHN MCCAIN,  
*Chairman, Committee on Commerce, Science, and Transportation,  
U.S. Senate, Washington, DC.*

DEAR MR. CHAIRMAN: The Congressional Budget Office has prepared the enclosed cost estimate for S. 1480, the Harmful Algal Bloom and Hypoxia Research and Control Act of 1998.

If you wish further details on this estimate, we will be pleased to provide them. The CBO staff contacts are Gary Brown (for federal costs) and Pepper Santalucia (for the state and local impact).  
Sincerely,

JAMES L. BLUM  
(For June E. O'Neill, Director).

Enclosure.

#### CONGRESSIONAL BUDGET OFFICE COST ESTIMATE

#### *S. 1480—Harmful Algal Bloom and Hypoxia Research and Control Act of 1998*

Summary: S. 1480 would authorize appropriations estimated at \$28 million in 1999 and \$26 million in each of the fiscal years 2000 and 2001 for (a) research, education, and management activities at the Department of Commerce related to preventing, reducing, and controlling algal blooms and hypoxia; (b) grants to states for controlling algal blooms and hypoxia in coastal zones; and (c) an inter-agency task force that would conduct studies on and recommend and monitor federal responses to algal blooms and hypoxia.

CBO estimates that implementing S. 1480 would result in new spending of \$78 million over the 1999–2003 period, assuming appropriation of the authorized amounts. Enacting S. 1480 would not affect direct spending or receipts; therefore, pay-as-you-go procedures would not apply. The legislation contains no intergovernmental or private-sector mandates as defined in the Unfunded Mandates Reform Act (UMRA) and would impose no costs on state, local, or tribal governments.

Algal blooms are implicated in fish kills and are considered a possible threat to public health. The recent outbreak of the microbe *Pfiesteria piscicida* is one example of an algal bloom. Algal blooms can also lead to other damaging marine conditions such as hypoxia (reduced oxygen concentrations), which can be harmful or fatal to fish and shellfish.

Estimated cost to the Federal Government: The estimated budgetary impact of S. 1480 is shown in the following table. The 1998 appropriated level for the activities authorized by this bill is about \$5 million. The costs of this legislation fall within budget function 300 (natural resources and environment).

[By fiscal year, in millions of dollars]

	1998	1999	2000	2001	2002	2003
SPENDING SUBJECT TO APPROPRIATION						
Spending under current law:						
Budget authority <sup>1</sup> .....	5	0	0	0	0	0
Estimated outlays .....	3	2	0	0	0	0
Proposed changes:						
Estimated authorization level .....	0	28	26	26	0	0
Estimated outlays .....	0	18	23	25	9	3
Spending under S. 1480:						
Estimated authorization level <sup>1</sup> .....	5	28	26	26	0	0
Estimated outlays .....	3	20	23	25	9	3

<sup>1</sup> The 1998 level is the amount appropriated for that year for the activities by S. 1480.

Basis of estimate: CBO assumes that S. 1480 will be enacted by September 30, 1998, and that the amounts authorized by the bill

will be appropriated near the start of each fiscal year. Estimated outlays are based on historical spending patterns for similar programs.

This bill would authorize \$25.5 million annually over the 1999–2001 period for research, education, and management activities at the Department of Commerce and an additional \$2 million over the 1999–2000 period for grants to states in coastal zones. For the purposes of this estimate, CBO assumes that the entire \$2 million authorized for state grants will be provided in 1999. The bill also would expand the scope of activities permitted under the Sea Grant College Program Act, but this provision would not change the amounts authorized for that program.

In addition to these specified authorizations, CBO estimates that the activities of the interagency task force would increase discretionary spending by about \$1 million over the 1999–2001 period, assuming appropriation of the necessary amounts. The task force would consist of at least 10 representatives from various federal agencies and would be required to prepare several reports and assessments. Based on information provided by the National Oceanic and Atmospheric Administration, CBO assumes that the task force would have a small staff and would meet only a few times a year. We assume that the President would terminate the task force after three years, as authorized by the bill.

Pay-as-you-go considerations: None.

Estimated impact on State, local, and tribal governments: S. 1480 contains no intergovernmental mandates as defined in UMRA, and would not impose any costs on state, local, or tribal governments. The bill would authorize appropriations of \$2 million to help coastal states control algal blooms and hypoxia. In addition, public colleges and universities in coastal states would be eligible for research grants from funds authorized by the bill.

Estimated impact on the private sector: None.

Previous CBO estimate: On October 31, 1997, CBO provided an estimate for S. 1219, the Pfiesteria Research Act of 1997, as ordered reported by the Senate Committee on Environment and Public Works on October 29, 1997. CBO estimated that implementing the bill would result in discretionary spending of \$10 million over the 1998–2000 period. That bill authorized appropriations totaling \$5 million for each of fiscal years 1998 and 1999 for establishing a research program for eradicating or controlling Pfiesteria piscicida and other aquatic toxins, and for making grants to colleges, universities, and other entities for this purpose.

Estimate prepared by: Federal costs: Gary Brown; Impact on State, local, and tribal governments: Pepper Santalucia.

Estimate approved by: Paul N. Van de Water, Assistant Director for Budget Analysis.

#### REGULATORY IMPACT STATEMENT

In accordance with paragraph 11(b) of rule XXVI of the Standing Rules of the Senate, the Committee provides the following evaluation of the regulatory impact of the legislation, as reported:

## NUMBER OF PERSONS COVERED

The reported bill requires the development of three Federal inter-agency action plans and authorizes research, monitoring, assessment, and State technical assistance funding through NOAA. It does not authorize any new regulations and therefore will not subject any individuals or businesses to new regulations.

## ECONOMIC IMPACT

Sections 5 and 7 of the reported bill authorize \$27.5 million in appropriations in each of fiscal years 1999 and 2000, and \$25.5 million in FY 2001. These funding levels are relatively modest and are not expected to have an inflationary impact on the nation's economy.

## PRIVACY

The reported bill will not have any adverse impact on the personal privacy of individuals.

## PAPERWORK

The reported bill will not increase paperwork requirements for the private sector. It requires the development of three Federal inter-agency actions plans and the submission of an annual report for three years to the Congress and the President.

## SECTION-BY-SECTION ANALYSIS

*Section 1. Short title*

This section of the reported bill cites the short title of the reported bill as the "Harmful Algal Bloom and Hypoxia Research and Control Act of 1998".

*Section 2. Findings*

This section of the reported bill contains the following Congressional findings related to HABs and hypoxia: (1) *Pfiesteria* is one example of HABs that are increasing in frequency and intensity in the Nation's coastal waters; (2) recent HAB occurrences include red tides, brown tides, ciguatera fish poisoning, and shellfish poisoning affecting a variety of states and territories; (3) HABs have resulted in fish kills, numerous deaths of endangered manatees, and in beach and shellfish bed closures; (4) scientists believe that factors contributing to HABs may include excessive nutrients in coastal waters, other types of pollution, the transfer of harmful species through ship ballast water, and ocean currents; (5) HABs have caused an estimated \$1,000,000,000 in economic losses during the past decade; (6) algal blooms can lead to hypoxia, a condition of reduced oxygen concentrations in coastal waters; (7) approximately 53 percent of U.S. estuaries experience hypoxia for at least part of the year and the Northern Gulf of Mexico suffers from chronic hypoxia in a zone more than 7,000 square miles in area; (8) scientists believe that the primary cause of hypoxia is excessive nutrients; (9) more workable and effective actions to reduce nutrient loadings to coastal waters need to be identified; (10) NOAA has the capabilities to support a comprehensive effort to prevent, reduce, and control

HABs and hypoxia; (11) funding for NOAA programs will improve the Nation's ability to deal with HABs and hypoxia; (12) other Federal agencies, along with the States, Indian tribes, and local governments, conduct important work related to HABs and hypoxia.

### *Section 3. Action plan*

Subsection (a) of this section of the reported bill requires the establishment of an Inter-Agency Task Force on Harmful Algal Blooms and Hypoxia (Task Force) through the Committee on Environment and Natural Resources of the National Science and Technology Council. The Task Force members include representatives of NOAA (serving as chair), EPA, USDA, the Departments of the Interior, the Navy, and Health and Human Services, NSF, NASA, and other agencies. The composition of this panel is similar to that of the Ad Hoc Task Force on *Pfiesteria* and of the inter-agency group formed through the Committee on Environment and Natural Resources that is currently examining the Northern Gulf of Mexico dead zone. Although the Task Force in this subsection would technically replace the Northern Gulf panel, the Committee anticipates that the Northern Gulf panel would continue its effort as part of the Task Force for the purposes of completing the Northern Gulf of Mexico dead zone assessment under section 4 of the reported bill.

Subsection (b) of this section charges the Task Force with the development of a comprehensive and coordinated national action plan dealing with HABs within one year of the date of enactment of S. 1480. In developing this action plan, the Task Force must consult with the coastal States, Indian tribes, and local governments, industry, academic institutions, and non-governmental organizations with expertise in coastal zone management. The action plan will identify the actions that each agency or department on the Task Force will take in the future to prevent, reduce, manage, mitigate, and control harmful algal blooms. Subsection (b) further requires the action plan to prevent unnecessary duplication of effort among Federal agencies and departments, and to provide for Federal cooperation and coordination with and assistance to the coastal States, Indian tribes, and local governments.

The HAB action plan will provide the framework for a sustained and coordinated Federal response to this urgent problem. The Committee recognizes that current Federal HAB activities, especially management activities, are insufficient and often conducted on an ad hoc basis, and that the States do not have adequate resources to manage HAB problems without assistance. Given the increasing number of HAB outbreaks and the growing costs associated with such episodes, Federal programs and policies will have to be improved if the nation is going to make progress on the problem. The agenda developed in the 1993 document "Marine Biotoxins and Harmful Algae: A National Plan," still guides inter-agency basic research efforts, and demonstrates the value of an organized and integrated approach to developing management strategies and conducting applied research.

Another positive example of the integrated, inter-agency approach to HAB work is the Ad Hoc Interagency Task Force on *Pfiesteria*. The task force has created an action plan dealing with

research and monitoring for this specific HAB. The plan has proved to be a useful tool for managers and scientists in states currently impacted, or likely to be impacted, by *Pfiesteria*. A comparable coordinated effort needs to be developed on a national scale for the many other HABs.

One essential element of a coordinated, Federal research and management effort is a continually updated storehouse of HAB species. In that regard, the Committee acknowledges the unique importance of the Bigelow Laboratory for Ocean Sciences' CCMP depository for marine algae and other phytoplankton species, and the need for NOAA and other Federal agencies to continue their recognition and support of this facility.

Section 3(c) requires the Task Force to develop a national action plan to address hypoxia no later than 12 months after the date of enactment of this Act. As part of this process, the Task Force is required to consult with the coastal States, Indian tribes, and local governments, industry, academic institutions, and non-governmental organizations with expertise in watershed and coastal zone management. This section specifies that the action plan will identify the needs, priorities, and guidelines for a competitive, peer-reviewed inter-agency research program on the causes, characteristics, and impacts of hypoxia (including both intramural and extramural research), and actions that Federal agencies and departments will take to prevent, reduce, manage, mitigate, and control hypoxia. The action plan must also contain measures to ensure the coordination of inter-agency activities and to avoid unnecessary duplication of effort among the agencies and departments. Building on the 1996 NECOP study, the hypoxia action plan required by this section will provide for a more substantial and coordinated Federal response to hypoxic conditions in coastal waters across the nation. The assessment currently being done for the Northern Gulf of Mexico provides a basis for the kinds of issues that need to be addressed in a national strategy.

Subsection (d) of this section requires the Task Force to report annually for three years to the Congress and the President beginning 12 months after publication of the action plans in subsections (b) and (c). Each report must describe the progress of the relevant agencies and departments in implementing the actions outlined in the plans, assess the effectiveness of the action plans, describe any changes to the plans, and provide any other pertinent information the Task Force may wish to include.

Subsection (e) of this section allows the President to disestablish the Task Force after submission of the third annual report in subsection (d). The Committee views the action plans as catalysts for a more effective Federal response to HABs and hypoxia. Since these plans will have been developed, implemented, and reviewed within three years of the date of enactment of S. 1480, a statutorily-mandated Task Force may no longer be necessary after that time. Should the Task Force be disestablished, however, the Committee expects that the Administration will maintain an administrative process to ensure that Federal activities on HABs and hypoxia remain well-coordinated in the future.

#### *Section 4. Northern Gulf of Mexico hypoxia*

Subsection (a) of this section of the reported bill requires the Task Force to submit to Congress and the President an integrated assessment of hypoxia in the Northern Gulf of Mexico no later than March 30, 1999. The assessment will examine a variety of pertinent issues, including the distribution and dynamics of hypoxia in the region, its ecological and economic consequences, the sources and loads of nutrients, and methods for reducing nutrient loads.

Subsection (b) of this section requires that, no later than March 30, 2000, the President shall develop and submit to Congress an action plan based on the assessment in subsection (a) for reducing, mitigating, and controlling hypoxia in the Northern Gulf of Mexico. This plan will be developed in consultation with State, Indian tribe, and local governments, and academic, agricultural, industry, and environmental groups. Subsection (b) also requires that at least 90 days prior to submission of the plan to Congress, a summary of the proposed plan will be published in the Federal Register and be open for public comment for not less than 60 days.

The existing Northern Gulf of Mexico Task Force is currently conducting the assessment of hypoxia in subsection (a). The individual section reports will be completed in the fall of 1998 and the integrated report is expected to be completed by March 30, 1999. The Committee has established a legislative mandate and deadline for this assessment to ensure that the report is completed in a timely manner.

#### *Section 5. Authorization of appropriations*

This section of the reported bill authorizes NOAA appropriations of \$25.5 million in each of fiscal years 1999, 2000, and 2001 for research, monitoring, and assessment activities for HABs and hypoxia. Such activities would be funded both within NOAA labs and through competitive, peer-reviewed extramural grants.

Paragraph (1) of this section authorizes appropriations of \$5 million in each fiscal year to fund intramural research and assessment activities in the laboratories of the National Ocean Service (NOS) and the National Marine Fisheries (NMFS) service. These activities include coastal monitoring, processing of samples, and the development of advanced testing techniques. Some of this work is already occurring in NOS and NMFS labs. Work in the NOS lab in Charleston, South Carolina, has focused on the biochemistry and toxicology of HABs. The NMFS Northwest Fisheries Science Center is examining food web interactions and coastal ecosystem health. Expansion of this research and monitoring is necessary to develop quicker and easier field tests, provide increased public health protections, and advance human understanding of the ecological impacts of HABs.

Paragraph (2) of this section authorizes appropriations of \$7 million in each fiscal year through NOAA's Coastal Ocean Program to fund NOAA's contributions to the ECOHAB program. This represents a doubling of the Administration's FY 1999 budget request for ECOHAB. Testimony received by the Committee from scientific experts, State officials, and industry representatives indicates that while ECOHAB is a very useful program, it has not received the level of funding necessary to substantially advance our knowledge

of HAB biology, ecology, and oceanography in a timely manner. This kind of information is critical to the development of effective strategies for preventing and managing HABs in the future.

Paragraph (3) of this section authorizes appropriations of \$3 million in each fiscal year for NOS to carry out a competitive, peer-reviewed research project on management measures. This can include both intramural and extramural research. The Committee expects that this project would be modeled on the ECOHAB project, and that it would involve contributions from other relevant Federal agencies. Scientists, State officials, and industry representatives have indicated that this kind of applied research is essential but is not presently being done on a significant basis.

Paragraph (4) of this section authorizes the appropriation of \$5.5 million annually to NOS for administration of Federal and State annual monitoring and analysis activities for HABs. These activities include the development of rapid response capabilities for dealing with outbreaks and critical assistance to State monitoring programs.

Paragraph (5) of this section authorizes the appropriation of \$5 million annually to NOS and NOAA's Office of Oceanic and Atmospheric Research (OAR) for hypoxia research and monitoring activities. This can include both intramural and extramural research and monitoring projects. The Committee expects that a large portion of this funding will be used to address the most severe case of chronic hypoxia in the United States—the Northern Gulf of Mexico. The remaining funds will be used for other cases of hypoxia in coastal waters throughout the nation.

#### *Section 6. Amendment to National Sea Grant College Program Act*

This section of the reported bill amends section 212(a) of the National Sea Grant College Program Act (33 U.S.C. 1131(a)) to allow up to \$3 million to be made available annually through the National Sea Grant College Program for competitive grants for university research, education, training, and advisory services on *Pfiesteria piscicida* and other HABs. In the National Sea Grant College Program Reauthorization Act of 1998 (Public Law 105-160), the Congress authorized up to \$3 million annually for Sea Grant competitive research grants on HABs. However, Sea Grant activities include not only research but also education, training, and advisory services programs. The amendment in this section clarifies that any HAB-specific Sea Grant funding provided through the authorization in P.L. 105-160 may be used to conduct these other kinds of projects as well as research projects.

#### *Section 7. Amendment to the Coastal Zone Management Act*

This section of the reported bill amends section 318(a) of the Coastal Zone Management Act of 1972 (CZMA) (16 U.S.C. 1464(a)) to authorize up to \$2 million in total appropriations during FY 1999 and FY 2000 for technical assistance under section 310 of the CZMA to support State implementation and analysis of the effectiveness of measures to prevent, reduce, mitigate, or control harmful algal blooms and hypoxia. The Committee did not provide an authorization for HAB and hypoxia technical assistance under the CZMA in FY 2001 because the act is due for reauthorization in the

106th Congress and the long-term prospects for this kind of technical assistance would be most appropriately addressed in that reauthorization.

#### CHANGES IN EXISTING LAW

In compliance with paragraph 12 of rule XXVI of the Standing Rules of the Senate, changes in existing law made by the bill, as reported, are shown as follows (existing law proposed to be omitted is enclosed in black brackets, new material is printed in *italic*, existing law in which no change is proposed is shown in roman):

#### COASTAL ZONE MANAGEMENT ACT OF 1972

##### AUTHORIZATION OF APPROPRIATIONS

SEC. 318 (16 U.S.C. 1464) (a) There are authorized to be appropriated to the Secretary, to remain available until expended—

(1) for grants under sections 306, 306A, and 309—

- (A) \$47,600,000 for fiscal year 1997;
- (B) \$49,000,000 for fiscal year 1998; and
- (C) \$50,500,000 for fiscal year 1999; **[and]**

(2) for grants under section 315—

- (A) \$4,400,000 for fiscal year 1997;
- (B) \$4,500,000 for fiscal year 1998; and
- (C) \$4,600,000 for fiscal year **[1999.]** *1999; and*

(3) *up to \$2,000,000 for fiscal years 1999 and 2000 for technical assistance under section 310 to support State implementation and analysis of the effectiveness of measures to prevent, reduce, mitigate, or control harmful algal blooms and hypoxia.”.*

(b) Federal funds received from other sources shall not be used to pay a coastal state's share of costs under section 306 or 309 [16 USCS @ 1455 or 1456b].

(c) The amount of any grant, or portion of a grant, made to a State under any section of this Act which is not obligated by such State during the fiscal year, or during the second fiscal year after the fiscal year, for which it was first authorized to be obligated by such State shall revert to the Secretary. The Secretary shall add such reverted amount to those funds available for grants under the section for such reverted amount was originally made available.

#### NATIONAL SEA GRANT COLLEGE PROGRAM ACT

##### SEC. 212. AUTHORIZATION FOR APPROPRIATIONS.

(33 U.S.C. 1131)@ 1131. AUTHORIZATION OF APPROPRIATIONS

(a) AUTHORIZATION.—

(1) IN GENERAL.—There is authorized to be appropriated to carry out this Act—

- (A) \$56,000,000 for fiscal year 1999;
- (B) \$57,000,000 for fiscal year 2000;
- (C) \$58,000,000 for fiscal year 2001;
- (D) \$59,000,000 for fiscal year 2002; and
- (E) \$60,000,000 for fiscal year 2003.

(2) ZEBRA MUSSEL AND OYSTER RESEARCH.—In addition to the amount authorized for each fiscal year under paragraph (1)—

(A) up to \$2,800,000 may be made available as provided in section 1301(b)(4)(A) of the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 (16 U.S.C. 4741(b)(4)(A)) for competitive grants for university research on the zebra mussel;

(B) up to \$3,000,000 may be made available for competitive grants for university research on oyster diseases and oyster-related human health risks; and

[(C) up to \$3,000,000 may be made available for competitive grants for university research on *Pfiesteria piscicida* and other harmful algal blooms.]

*(C) up to \$3,000,000 may be made available for competitive grants for university research, education, training, and advisory services on Pfiesteria piscicida and other harmful algal blooms.*

(b) PROGRAM ELEMENTS.—

(1) LIMITATION.—No more than 5 percent of the lesser of—

(A) the amount authorized to be appropriated; or

(B) the amount appropriated, for each fiscal year under subsection (a) may be used to fund the program element contained in section 204(b)(2).

(2) Sums appropriated under the authority of subsections (a) and (c) shall not be available for administration of this Act by the National Sea Grant Office, or for Administration program or administrative expenses.

(c) PRIORITY OYSTER DISEASE RESEARCH.—In addition to sums authorized under subsection (a), there is authorized to be appropriated for priority oyster disease research under section 205 of this Act, an amount—

(1) for fiscal year 1992, not to exceed \$1,400,000;

(2) for fiscal year 1993, not to exceed \$3,000,000;

(3) for fiscal year 1994, not to exceed \$3,000,000; and

(4) for fiscal year 1995, not to exceed \$3,000,000.

(d) AVAILABILITY OF SUMS.—Sums appropriated pursuant to this section shall remain available until expended.

(e) REVERSION OF UNOBLIGATED AMOUNTS.—The amount of any grant, or portion of a grant, made to a person under any section of this Act that is not obligated by that person during the first fiscal year for which it was authorized to be obligated or during the next fiscal year thereafter shall revert to the Secretary. The Secretary shall add that reverted amount to the funds available for grants under the section for which the reverted amount was originally made available.